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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,245	02/09/2004	Yasuharu Sasaki	248707US2	7165

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EXAMINER	
DHINGRA, RAKESH KUMAR	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 05/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/773,245	SASAKI ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-45* is/are pending in the application.

4a) Of the above claim(s) *9,11,14 and 26-45* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10,12,13 and 15-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 July 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of invention of group 1 and species 1 (claims 1-8, 10-25, 38-40 reading on the elected species) in the reply filed on 02/17/06 is acknowledged. This is not found persuasive because apparatus as per invention of group I can be used for other applications like cleaning a chamber or chamber component whereas method as per invention of group II is specifically used for substrate processing by supplying controlled DC voltage to focus ring to adjust plasma sheath region.

The requirement is still deemed proper and is therefore made FINAL.

Further, claims 11, 14 and 38-40 have been withdrawn from consideration since these belong to non-elected species- species 5 (claims 11, 14) and species 4 (claims 38-40).

Accordingly Claims 9,11,14, 26-45 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species/invention.

Drawings

The drawings are objected to because of following:

1) Figure 1 – pointer lines for reference number 45 (chuck electrode) and reference number 46 (insulation layer) may please be corrected since these are not correctly pointing in the drawing;

2) Figure 7 – Reference number 92B is repeated both for left and right cassette chambers – the drawing should indicate reference number 92A for the left cassette chamber (page 30, line 13).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

Page 13, line 4 – sentence "a base material ------the periodic table" is a repeat of the previous sentence (starting at page 13, line 1);

Page 28, line 52 – "match" may please be replaced with "matched";

Page 40, line 15 – "ranging from 50 – 100 ...." may please be corrected by adding the unit of measurement in the sentence;

Page 42, line 16 – "from 10 – 200 ...." may please be corrected by adding the unit of measurement in the sentence;

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites " wherein the one or more electrodes in the ring member are installed along a diametrical direction and respective DC voltages applied to the one or more electrodes are adjusted independently" which is indefinite since "DC voltage adjusted independently" is relevant only in case the focus ring has more than one electrode. For the purpose of examination on merits therefore this limitation has been interpreted as "wherein the electrode in the ring member is installed along a diametrical direction and DC voltages applied to the electrode is adjustable".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Hong et al (US Patent No. 5,897,752).

Regarding Claims 1, 5: Hong et al teach a plasma processing apparatus (Figures 2, 3) for performing a processing on a to-be- treated substrate 16 mounted on a pedestal (mounting table) 18 in a chamber (processing vessel) 12 by plasma of a processing gas comprising:

a clamping ring (ring member) 46 formed of ceramic (an insulating material) and installed to surround the to-be- treated substrate 16 on the mounting table 18;

a metallic film (one or more electrodes) installed in the ring member; and

a DC power supply 44 for applying a DC voltage to the one or more electrodes (through electrical line 52) to adjust a plasma sheath region above the ring member (column 4, line 55 to column 6, line 45).

Regarding Claims 2, 6: Hong et al teach that DC power supply 44 is variable and with the help of controller 30 enables to apply controlled biasing voltage to the ring member 46 as per process requirements.

Regarding Claims 3, 7: Hong et al teach all limitations of the claim except that process is etching of thin film. This is a process limitation and the apparatus of Hong et al is capable of being used for the same by adjusting power levels applied to target and pedestal.

In this regards courts have ruled (Case law):

"A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)."

"It is well settled that the intended use of a claimed apparatus is not germane to the issue of the patentability of the claimed structure. If the prior art structure is capable of performing the claimed use then it meets the claim. *In re Casey*, 152 USPQ 235, 238 (CCPA 1967); *In re Otto*, 136 USPQ 459 (CCPA 1963)."

"Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Apparatus claims cover what a device is, not what a device does *Hewlett-Packard Co. V. Bausch & Lomb Inc.*, 15USPQ2d 1525, 1528 (Fed. Cir. 1990)."

Regarding Claims 4, 8: Hong et al teach that metallic body (electrode) 46 is in the form of coating (diametrical direction - in a broad sense) and DC power supply 44 is variable (adjustable).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10, 13, 16-18, 21, 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hong et al (US No. 5,897,752) in view of O'Donnell et al (US PGPUB No. 2005/015,0866) and Fakuda et al (US PGPUB No. 2003/0113479).

Regarding Claim 10: Hong et al teach all limitations of the claim as explained above except the film on focus ring and sealing of film by resin.

O'Donnell et al teach an apparatus (Figures 4-6) that includes a focus ring 14 and comprising:

aluminum (base material); and

a film (layer 100) formed by thermal spraying of yttria-containing coating (ceramic) [Paragraphs 0041, 0054, 0057, 0059, 0062-0066].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use focus ring with ceramic coating as taught by O'Donnell et al in the apparatus of Hong et al to provide improved wear resistance to physical and /or chemical attack in plasma environment (paragraph 0010).

Hong et al in view of O'Donnell et al do not teach at least a portion of thermally sprayed film is sealed by a resin.

Fakuda et al teach a plasma treatment apparatus (Figure 1) that includes internal members 3a, 3b, 7 that are coated with dielectric layers (thermally sprayed ceramic layers) 4a, 4b, 6. Fakuda et al further teach that a sealing treatment is carried out on top of dielectric layer to reduce the void volume of the dielectric coating [Paragraphs 0067-0080].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to seal the thermally sprayed film by resin as taught by Fakuda et al in the apparatus of Hong et al in view of O'Donnell et al to reduce void volume of barrier coating (paragraph 0080).

Regarding Claims 13, 21: Fakuda et al teach that thermally sprayed ceramic layer is sealed through sol-gel method (Paragraphs 0098, 0099).

Regarding Claim 16: O'Donnell et al teach that main layer is formed of Yttria (Y2O3) {Paragraph 0041}.

Regarding Claims 17,18: O'Donnell et al teach (Figures 4-6) that focus ring 14 comprises aluminum (base material), and a film formed on a surface of the base material, wherein the film has a main layer 100 formed by thermal spraying of yttria-containing coating (ceramic) and an intermediate coating (barrier coat layer) 80 formed of Al2O3 (ceramic) [Paragraphs 0041, 0059, 0062-0066].

Regarding Claims 23, 24: Hong et al in view of O'Donnell et al teach all limitations of the claim including that intermediate coating (barrier coat layer) 80 can be formed of polymers like polyimides and polytetrafluoroethylene (PTFE) {engineering plastics} [O'Donnell et al - paragraph 0065].

Regarding Claim 25: O'Donnell et al teach that main layer 100 is formed of Yttria (Y2O3) [0062].

Claims 12, 19, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hong et al (US No. 5,897,752) in view of O'Donnell et al (US PGPUB No.

2005/015,0866), Fakuda et al (US PGPUB No. 2003/0113479) as applied to Claims 10, 17 and further in view of George et al (US patent No. 4,357,387).

Regarding Claims 12, 19, 20: Hong et al in view of O'Donnell et al and Fakuda et al teach all limitations of the claim including barrier coat layer is thermally sprayed film and also teach sealing of thermally sprayed film using a resin.

Hong et al in view of O'Donnell et al and Fakuda et al do not teach resin is selected from the group consisting of SI, PTFE, PI, PAI, PEI, PBI and PFA.

George et al teach sealing of thermally sprayed refractory (includes ceramic) coating using resins to improve surface abrasion and durability of coatings. George et al further teach that sealing resin can be polyimide resin, polyamideimide resin etc (Column 2, lines 55-65 and Column 7, lines 10-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to seal the thermally coated film using resin as taught by George et al in the apparatus of Hong et al in view of O'Donnell et al and Fakuda et al to improve its surface abrasion and durability.

Claims 15, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hong et al (US No. 5,897,752) in view of O'Donnell et al (US PGPUB No. 2005/015,0866), and Fakuda et al (US PGPUB No. 2003/0113479) as applied to Claims 13, 21 and further in view of Panitz et al (US Patent No. 5,925,228).

Regarding Claims 15, 22: Hong et al in view of O'Donnell et al and Fakuda et al teach all limitations of the claim except that sealing treatment uses a group 3a element.

Panitz et al teach an apparatus (Figures1, 2A-2C) where a Al2O3 – SiO2 (Al is an element from group 3a) solution is used for sol-gel sealing treatment of porous coatings on metallic substrates to control pore size and density of ceramic coatings on the substrate (Column 3, line 5 to Column 4, line 40).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use group 3a element for sealing of coating as taught by Panitz et al in the apparatus of Hong et al in view of O'Donnell et al and Fakuda et al to control pore size and density of ceramic coatings on metal substrates.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.
Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 5, 10, 12, 13,15-25 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3-5, 7, 9-

14,16-18 of copending Application No. 10/722, 602 in view of Hong et al (US Patent No. 5,897,752).

Claims 1,3 of co-pending application teach an internal member (includes ring member) of a plasma processing apparatus comprising a base material; and a film formed by thermal spraying of ceramic on a surface of the base material, wherein the film is formed of ceramic including at least one kind of element selected from the group consisting of B, Mg, Al, Si, Ca, Cr, Y, Zr, Ta, Ce and Nd, and at least a portion of the film is sealed by a resin, wherein the resin is selected from the group consisting of SI, PTFE, PI, PAI, PEI, PBI and PFA;

Claim 5 of co-pending application teaches an internal member (includes ring member) of a plasma processing vessel, comprising a base material; and a film formed by thermal spraying of ceramic on a surface of the base material, wherein the film is formed of ceramic including at least one kind of element selected from the group consisting of B, Mg, Al, Si, Ca, Cr, Y, Zr, Ta, Ce and Nd, and at least a portion of the film is sealed by a sol-gel method;

Claims 7, 9-14 of co-pending application teach the internal member (includes ring member) wherein the sealing treatment is executed by using an element of the Group 3A in the periodic table and;

internal member of the plasma processing vessel comprises a base material, and a film formed on a surface of the base material, wherein the film has a main layer formed by thermal spraying of ceramic and a barrier coat layer formed of ceramic including an

element selected from the group consisting of B, Mg, Al, Si, Ca, Cr, Y, Zr, Ta, Ce and Nd, and;

the barrier coat layer is formed of at least one kind of ceramic selected from the group consisting of B.sub.4C, MgO, Al.sub.2O.sub.3, SiC, Si.sub.3N.sub.4, SiO.sub.2, CaF.sub.2, Cr.sub.2O.sub.3, Y.sub.2O.sub.3, YF.sub.3, ZrO.sub.2, TaO.sub.2, CeO.sub.2, Ce.sub.2O.sub.3CeF.sub.3 and Nd.sub.2O.sub.3., and;

wherein the barrier coat layer is a thermally sprayed film at least a portion of which is sealed by a resin, and;

wherein the resin is selected from the group consisting of SI, PTFE, PI, PAI, PEI, PBI and PFA, and;

wherein the barrier coat layer is a thermally sprayed film at least a portion of which is sealed by a sol-gel method, and;

wherein the sealing treatment is executed by using an element of the Group 3a in the periodic table;

Claims 16-18 of co-pending application teach an internal member (includes ring member) of a plasma processing vessel, comprising a base material and a film formed on a surface of the base material, wherein the film has a main layer formed by thermal spraying of ceramic and a barrier coat layer formed of engineering plastic formed between the base material and the main layer, and;

wherein the engineering plastic is selected from the group consisting of PTFE, PI, PAI, PEI, PBI, PFA, PPS and POM, and;

wherein the main layer is formed of at least one kind of ceramic selected from the group consisting of B.sub.4C, MgO, Al.sub.2O.sub.3, SiC, Si.sub.3N.sub.4, SiO.sub.2, CaF.sub.2, Cr.sub.2O.sub.3, Y.sub.2O.sub.3, YF.sub.3, ZrO.sub.2, TaO.sub.2, CeO.sub.2, Ce.sub.2O.sub.3, CeF.sub.3 and Nd.sub.2O.sub.3.

Claims 1, 3, 5, 7, 9-14, 16-18 of copending application do not teach substrate mounted on a mounting table in a processing vessel by plasma of a processing gas and a ring member formed of an insulating material and comprising of one or more electrodes to each of which a DC voltage is applied to adjust a plasma sheath region above the ring member.

Hong et al teach a plasma processing apparatus (Figures 2, 3) for performing a processing on a to-be- treated substrate 16 mounted on a pedestal (mounting table) 18 in a chamber (processing vessel) 12 by plasma of a processing gas comprising:

a clamping ring (ring member) 46 formed of ceramic (an insulating material) and installed to surround the to-be- treated substrate 16 on the mounting table 18;

a metallic film (one or more electrodes) installed in the ring member; and

a DC power supply 44 for applying a DC voltage to the one or more electrodes (through electrical line 52) to adjust a plasma sheath region above the ring member (column 4, line 55 to column 6, line 45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use focus ring of insulating material and having electrode to which DC voltage is applied as taught by Hong et al in the apparatus of Claims 1, 3, 5, 7, 9-14, 16-

18 of co-pending application to enable control sheath voltage and energy and directionality of sputtered ions incident upon the substrate.

This is a provisional obviousness-type double patenting rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Kikuchi et al (WO 03/009363, which is equivalent to US PGPUB No. 2004/0177927) teach an apparatus (Figure 15) that includes an etching chamber 1 with a lower electrode 4 with an electrostatic chuck 8 for supporting a wafer W that is surrounded by a focus ring 9. Kikuchi et al further teach that focus ring 9 is biased with DC voltage through a DC voltage application unit 33. Kikuchi et al also teach a controller 71 for controlled supply of voltage to surface of wafer W (paragraphs 0037, 0038, 0071-0087, 0142-0143).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rakesh Dhingra

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